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A new species of the genus *Trapelus* Cuvier, 1816 (Squamata: Agamidae) from arid central Africa

Philipp Wagner & Wolfgang Böhme
Bonn, Germany

Abstract. The Saharo-Sindian genus *Trapelus* contains 14 species, four of which occur in northern Africa. One of these taxa, Trapelus mutabilis, has a very widespread distribution from West to East Africa along the northern Saharan border. It has been identified as a species complex that includes several cryptic taxa. Together with a key of the so far described African species of the genus, the description of the first of these cryptic taxa is presented here.

Keywords. Squamata, Agamidae, *Trapelus* sp. n., Africa, Chad, Ennedi mountains.

1. INTRODUCTION

In his guiding work Moody (1980) revised the family Agamidae and resurrected the genus *Trapelus* Cuvier, 1816. The taxa of the genus are characterized by short and thick heads and a small, deeply sunk tympanum with some spiny scales above the ear-opening. About 14 species of the genus are recognized and are distributed from northwestern Africa, along the Saharan border, through the Near East to southwest and central Asia. Four of them occur in Africa [*Trapelus mutabilis* (Merrem, 1820): northern Africa; *Trapelus pallidus* (Reuss, 1833): Egypt; *Trapelus savignii* (Duméril & Bibron, 1837): Egypt; *Trapelus tournevillei* (Lataste, 1880): Algeria, Tunisia.] with a distribution centre in north-eastern Africa. Most of the Egyptian taxa occur eastwards to the Near East and Egypt is the westernmost border of their distribution. The synonymisation of *T. flavimaculatus* with *T. savignii* by Saleh (1997) is not followed by us in this article, because Saleh (1997) failed to give reasons for this important taxonomic step. The two taxa are clearly distinct both in morphometrics and colouration (Baha el Din 2006), but the former taxon is restricted to Arabia and does not extend into northeastern Africa.

Trapelus mutabilis is perhaps the most complicated and widespread species within the African group. However, it is evident that this taxon represents a species complex including several cryptic taxa. The variability of *T. mutabilis* is already indicated by the high number of synonyms and different descriptions of the species in the relevant literature (Wermuth 1967). For instance, Schleich et al. (1996) referred to blue throated specimens from Cyrenaica (Libya) and mentioned that the taxonomic status of these specimens remained unclear. Further work on a revision of this complex will be done by the authors in the near future.

Trapelus pallidus was also for a time (e. g. Wermuth 1967) considered a junior synonym of *T. mutabilis* but is now again regarded as a valid species (e.g. Pasteur & Bons 1960, Marx 1968, Saleh 1997). Baha el Din (2006) also discussed this topic and drew attention to differences in morphology, colouration, behaviour and habitat. He also mentioned that *T. pallidus* occurs exclusively east of the Nile, whereas *T. mutabilis* occurs west of the Nile.

The new species described herein is closely related to *T. mutabilis* but differs significantly in morphology, body proportions and colour pattern from all other known species of the genus. The *T. mutabilis* complex is distributed in northern Africa [Western Sahara (Geniez et al. 2004), Mauritania (Padial 2006), Morocco (Pasteur & Bons 1960), Algeria (Doumergue 1901), Tunisia (Joger 2003), Libya (Schleich et al. 1996), Egypt (Baha el Din 2006), Mali (Joger & Lambert 1996), Sudan (Geniez et al. 2004)]. Some previously described taxa are currently regarded as synonyms [*Trapelus aegyptius* Cuvier, 1829; *Agama inermis* Reuss, 1833; *Agama gularis* Reuss, 1833; *Agama aspera* Werner, 1893; *Agama latastii* Boulenger, 1885] of this widespread species. Records from the Near East are now known to belong to *Trapelus pallidus* [e. g. Israel, Jordan and Iraq fide Khalaf (1959)].

In addition to the relevant literature we used the material housed in ZFMK (see Appendix) to compare the new species with voucher specimens of the relevant taxa. The synonymy follows Wermuth (1967). Measurements and scale counts were done according to Grandison (1968) and Moody & Böhme (1984). Measurements were taken with a dial calliper to the nearest 0.1 mm.

2. RESULTS & DISCUSSION

Trapelus schmitzi sp. n.

Holotype. ZFMK 2590; Guelta Archei, Ennedi Mountains, Chad; leg. G. Niethammer, April 1954.

Diagnosis. A small species of *Trapelus*, with a short and thick head, a dark throat and a homogenous, smooth to feebly keeled dorsal scalation intermixed with a few larger keeled scales of the same shape. Scalation of hindlimb homogenous. The new species differs from all described African taxa of the genus by its body proportions, a short tail, its dorsal scalation and the uniformly dark-coloured throat.

Trapelus schmitzi sp. n. differs:

- from *T. savignii* (type locality: Egypt) and *T. flavimaculatus* (type locality: Djetta, Arabien) in having smooth ventral scales and in having a very small gular pouch instead a large one.
- from *T. mutabilis* (type locality: Egypt) in having no keeled, enlarged dorsal scales, in a higher number of preanal pores (8 to 12 in *T. mutabilis* [SCHLEICH at al. 1996] instead of two rows of 18 [10+8] in *T. schmitzi* sp. n.), a shorter tail (average of 102.6 mm in *T. mutabilis* and 82.65 mm in *T. schmitzi* sp. n.) and a more or less homogenous dorsal scalation.
- from *T. pallidus* (type locality: 'Oberägypten'= southern Egypt) in having a homogenous hindlimb scalation.

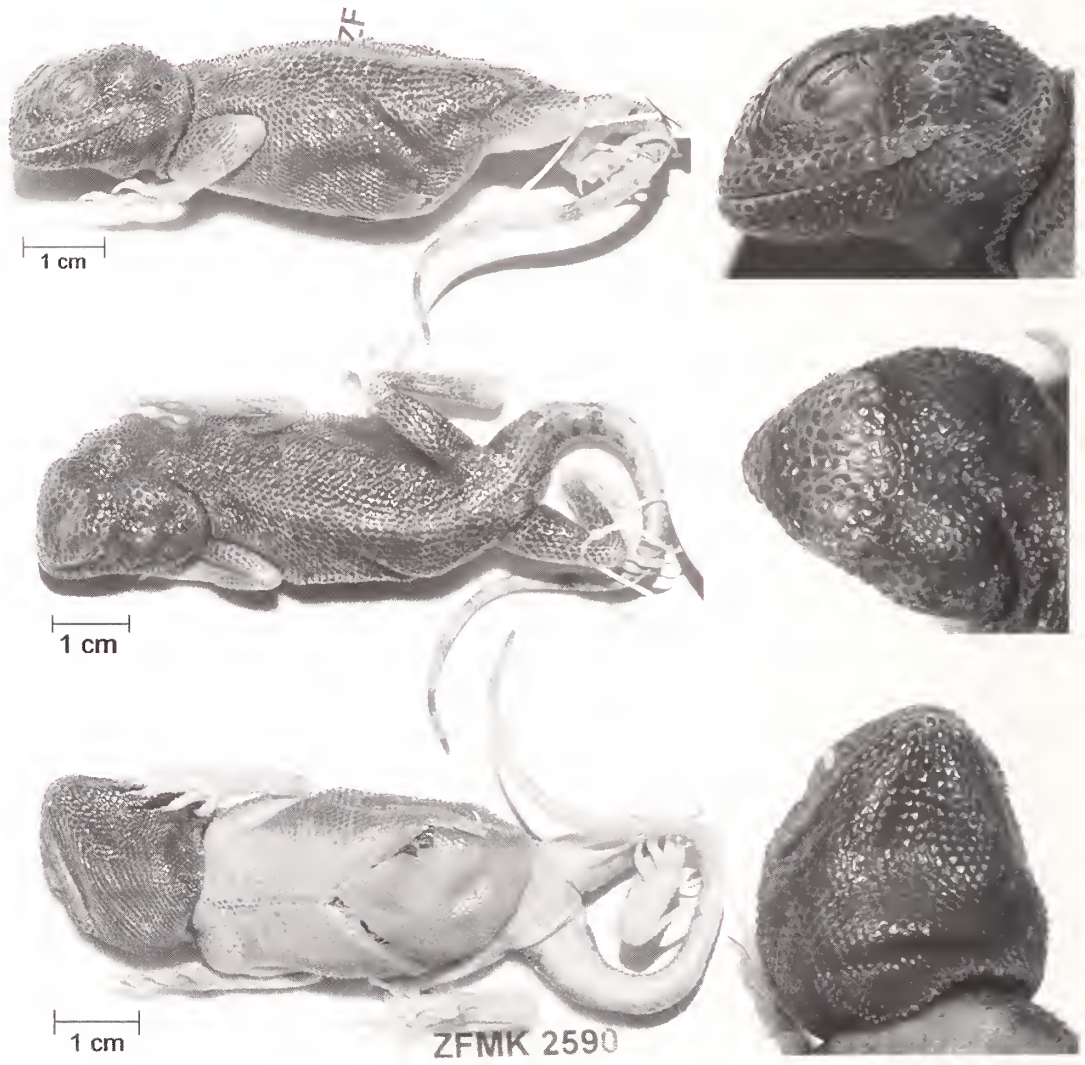

Fig. 1. Holotype of *Trapelus schmitzi* sp. n.

– from *T. tournevillei* (type locality: Ouargla, Algeria) in having shorter body and head proportions, a smaller gular pouch, and smooth to feebly keeled dorsal scales instead of keeled to strongly keeled ventral scales in *T. tournevillei*.

From the available and potentially valid synonyms of *T. mutabilis* (synonymy after WERMUTH 1967) the new species differs as follows:
– from *Agama inermis* Reuss, 1833 (type locality: 'Oberägypten'= southern Egypt) in having smooth to feebly keeled dorsal scales and a more or less homogenous scalation.
– from *Agama gularis* Reuss, 1833 (type locality: 'Oberägypten'= southern Egypt) in having no strongly enlarged dorsal scales and smooth to feebly keeled dorsal scales.
– from *Agama latastii* Boulenger, 1885 (type locality: Egypt) in not having four pairs of quadrangular dark spots, body not depressed and in having a homogenous dorsal scalation intermixed with larger scales.
– from *Agama leucostigma* Reuss, 1833 (type locality: 'Oberägypten'= southern Egypt) in shorter head proportions. The latter has a long head with the broadest point before the ear hole and additionally only two mucronate scales on the superiorly margin of the ear hole.
– from *Agama aspera* Werner, 1893 (type locality: Algerian Sahara between Kef-el-Dhor and Chegga; Biskra-Bordj-Saada; Zab-el-Zig south of El Meranyer) in having smooth or feebly keeled dorsal scales and in having two rows of preanal pores.

Description of the holotype. Habitus stout, tail moderately longer than the body, limbs long.

Measurements. Snout-vent length 69.1 mm; tail length 82.65 mm; head length 20.89 mm; head height 11.7 mm; head width 18.91 mm; length of forelimb 36.84 mm; length of hindlimb 51.5 mm.

Scalation. Nostril on canthus rostralis, pierced in the posterior part of a large, flat nasal scale, directed obliquely upwards. Irregularly arranged smooth scales between nostrils; interorbital region a median row of three more-or-less longitudinal scales separating the sideward originating scales. Supraoculars smooth. Parietal scale more or less round, not enlarged; pineal organ visible, pierced in the middle; parietal scale surrounded by seven slightly enlarged scales. Scales originating from both sides of the parietal midline have their imbrications anteriorly directed, free anterior margins of the scales rarely with sensory pits. Eyelids with a series of mucronate scales forming a ring. Ear-opening small, tympanum sunk, not visible, about one third of the size of eye, its superior margin with four spiny, mucronate scales. Rudimentary nuchal crest of only one spiny, mucronate scale. Gular scales flat, smooth, slightly imbricate at their posterior margins, becoming somewhat smaller towards the gular fold. Gular pouch small. Dorsal scales homogenous, smooth to feebly keeled, partly mucronate, intermixed with few larger and feebly keeled, mucronate scales. Scales on tail smooth, becoming keeled and mucronate posteriorly, not arranged in whorls. Tail cylindrical, 20 % longer than the snout-vent

Fig. 2. Holotype of *Trapelus schmitzi* sp. n. in comparison with other African taxa of the genus. From left to right: *T. schmitzi* sp. n., holotype; *T. mutabilis*, Egypt, ZFMK 2520; *T.* aff. *mutabilis*, Sudan, ZFMK 2530; *T.* aff. *mutabilis*, Algeria, ZFMK 49664; *T.* sp. n., Morocco, ZFMK 49751; *T.* sp. n., Morocco, ZFMK 49741; *T. pallidus*, Egypt, ZFMK 2537; *T. tournevillei*, Tunisia, ZFMK 17986.

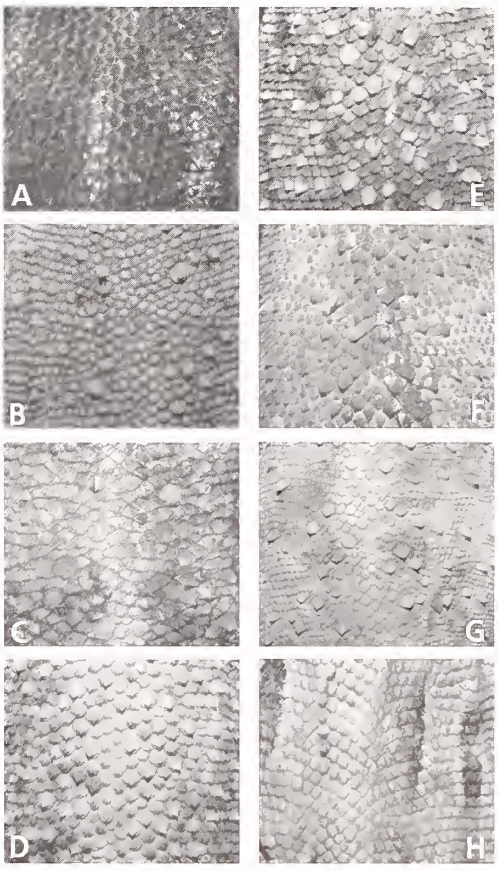

Fig. 3. Dorsal scalation of **A:** *T. schmitzi*, holotype; **B:** *T. mutabilis*, Egypt, ZFMK 2520; **C:** *T.* aff. *mutabilis*, Sudan, ZFMK 2530; **D:** *T.* aff. *mutabilis*, Algeria, ZFMK 49664; **E:** *T.* sp. n., Morocco, ZFMK 49751; **F:** *T.* spec. nov., Morocco, ZFMK 49741; **G:** *T. pallidus*, Egypt, ZFMK 2537; **H:** *T. tournevillei*, Tunisia, ZFMK 17986.

length. Ventral scales smooth and slightly imbricate. Two rows of 18 (10 anterior, 8 posterior) preanal pores. Upper forelimbs with strongly keeled scales becoming feebly keeled beneath, homogenous in size. 4th finger longest, digital length decreasing 3-2-5-1, plantar scales and subdigital lamellae strongly keeled. Scales on hindlimbs homogenous, smooth to feebly keeled and mucronate, becoming more strongly keeled beneath, on the femora as large as the dorsals, becoming slightly larger towards the tibiae and feet. 4th toe longest, digital length decreasing 3-5-2-1, hindlimb long, reaching the eye with the tip of the longest digit.

Colouration in alcohol. Dark grey above without any darker markings, pale vertebral stripe visible, tail annulated dark grey and white, belly and under parts of the tail whitish-grey, gular region uniform dark grey to black, laterally with pale reticulations.

Habitat. If the voucher was collected at Guelta Archei (see below) the habitat is thornbush savannah with sandy soils (see figs. 4 and 5).

Etymology. We dedicate this new species to our good friend and colleague Dr. Andreas Schmitz, Research Officer of Herpetology at the Muséum d'Histoire Naturelle, Genève, Switzerland, in recognition of his valuable contributions to African herpetology.

Distribution and habitat. So far, the new species is only known from the holotype. It was collected by the 'Kollmannsberger International Sahara Expedition' in the Ennedi Mountains in Chad. The specimens collected during this expedition were divided up between several institutions. The specimens collected by Günther Niethammer, a well known German ornithologist, Professor at the University of Bonn and Curator of Ornithology at the Zoologisches Forschungsmuseum A. Koenig, are deposited in Bonn, while specimens collected by Franz Kollmannsberger are deposited in the collection of the University of Saarbrücken. Because the holotype of *T. schmitzi* sp. n. was catalogued shortly after Niethammer's return to Bonn, it belonged to his portion of the material and was thus collected by him. In the Ennedi Mountains, the expedition took two different routes (Kollmannsberger 1957). Niethammer remained at Guelta Archei to collect birds, while Kollmannsberger crossed the mountains to the northern parts of the Ennedi.

Taxonomic relationships & biogeography. As mentioned in the introduction, *T. mutabilis* is a species complex with several cryptic taxa. *T. schmitzi* sp. n. differs strongly from the typical *T. mutabilis* from Egypt but resembles in some parts of its morphology a population of *T.* aff. *mutabilis* from the Sudan. This hitherto undescribed form (Wagner unpubl. data) is probably the immediate sister species of *T. schmitzi* sp. n.

This correlates with a biogeographic pattern of the sub-Saharan savanna belt. Böhme (1985) and Moody & Böhme (1984) recognized a distribution gap of typical reptile species of the sub-Saharan belt roughly between Ndélé (Central African Republic) and El Fasher (Sudan). The *Uromastyx acanthinura-geyri-dispar* complex shows nearly the same distribution pattern as the *Trapelus mutabilis* complex. Wilms & Böhme (2000) differentiated three morphologically distinct clades of which the eastern one, from Tibesti and Ennedi Mountains to Sudan, belongs to *U. dispar dispar*, whereas the western populations belong to *U. dispar maliensis* and *U. dispar flavifasciata*. This distribution pattern suggests that *Trapelus schmitzi* sp. n. might also occur in the Sudan.

Key to the African species of *Trapelus*:

1 – Ventrals keeled, nuptial colouration of males blue, spotted white, tail reddish; females grey with dark crossbars. *T. savignii*
– Ventrals smooth. 2

2 – Hindleg scalation heterogeneous; flat nasal scale, nostril on canthus rostralis, occiput with few spines, no gular pouch, dorsal scales smooth or indistinctly keeled, hindleg scalation heterogeneous, 3rd finger shorter than 4th. *T. pallidus*
– Hindleg scalation homogenous. 3

3 – Dorsal scalation heterogeneous; 3rd finger longer than 4th. Swollen nasal scale, nostril dorsal positioned, occiput without spines, ventrals smooth or feebly keeled, dorsal scales heterogeneous intermixed with larger scales, hindleg scalation homogenous, small gular pouch in males.
T. mutabilis complex
– Dorsal scalation sub-homogenous; 3rd finger shorter than 4th. 4

4 – Dorsal head scales smooth, four spinose scales on the upper border of the ear-opening dorsal scales equal, smooth to feebly keeled and mucronate, with some intermixed enlarged scales, small gular pouch, dark coloured throat, belly whitish, tail short, little longer as snout-vent-length, two rows of preanal scales in males. *T. schmitzi* sp. n.
– Upper head scales smooth, not enlarged on occiput, no spinose scales on head, very slight fringe of pointed scales on the upper border of the ear-opening, dorsal scales equal, granular, strongly keeled and not mucronate, one row of preanal scales in males, large gular pouch, belly whitish with dark longitudinal stripes, tail long, two and a half as long as the distance from gular fold to vent, covered with equal keeled scales.
T. tournevillei

Fig. 4. Habitat of *T. schmitzi* sp. n. around Guelta Archei, Ennedi Mts., at the time of the Kollmannsberger Expedition.

Fig. 5. Habitat of *T. schmitzi* sp. n. at Guelta Archei, Ennedi Mts., at the time of the Kollmannsberger Expedition.

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Authors' address: Philipp WAGNER (corresponding author), Wolfgang BÖHME, Zoologisches Forschungsmuseum A. Koenig, Adenauerallee 160, D-53113 Bonn, Germany.
philipp.wagner.zfmk@uni-bonn.de;
w.boehme.zfmk@uni-bonn.de

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APPENDIX

Material examined

Trapelus mutabilis* & *Trapelus* aff. *mutabilis: ALGERIA: Bechar (ZFMK 49664); Biscra (ZFMK 2487-2490); Bou Sada (ZFMK 49828); Dra el Kastir (ZFMK 2491-2492); El Beioth (ZFMK 2497); Ghardaia (ZFMK 49653-657); Hoggar: Arak (ZFMK 20079), In Eker (ZFMK 20080), Oued Dahim (ZFMK 2498-2499), Thar-emert-Ak (ZFMK 2501-2502), Amguid (ZFMK 2500), Hoggar (ZFMK 2503); Laghout (ZFMK 19416-418); Ouargla (ZFMK 2494-2496); Ounif (ZFMK 7431); Tadmeit (ZFMK 2493); Touggourt: Djamda (ZFMK 2452-2486, 17988). EGYPT: Assuan (ZFMK 2517-2518); Kairo (ZFMK 2514-2516, 2519-2526, 2527-2528, 64395-396); Sinai: Abu Muilah (ZFMK 2573), Ain Mouta (ZFMK 2569), Nachla (ZFMK 2565-2568), Sinai (2532-2551), Sudar (ZFMK 64400), Wadi Chbeb (ZFMK 2562-2564), Wadi el Arisch (ZFMK 2552-2561), Wadi Feran (ZFMK 77473), Wadi Ramleh (ZFMK 2571-2572), Wadi Scheeh (ZFMK 2570); Ras Matarma (ZFMK 65474). LIBYA: Tripolis (ZFMK 20848). MOROCCO: Akka (ZFMK 49751-754); Erfoud (ZFMK 49741); Ksar EsSouk (ZFMK 7432); Tafilalt: Erfoud (ZFMK 26183). SUDAN: Bajuda desert: Chor Abu Harraq (ZFMK 2529-2531); Dafur: Rahib Wells (ZFMK 32471-476). TUNISIA: Sousse: Sebkha (ZFMK 2504-2505); Tozeur: Oasis Stil (ZFMK 17987), El Hamma du Djerid (ZFMK 29048-049); Tunisian Sahara (ZFMK 2506-2513). ***Trapelus pallidus***: EGYPT: (ZFMK 2537): JORDANIA: Azrag (ZFMK 44317); Shawbak (ZFMK 44320); Wadi Khanzira (ZFMK 44321). ***Trapelus savignyi***: EGYPT: Sinai: Ghaza (ZFMK 2574-2580). ***Trapelus tournevillei***: ALGERIA: Ain Taiba (ZFMK 2600); Bir Laif: El Alia (ZFMK 2594); El Beioth (ZFMK 2599); El Muilah (ZFMK 2591-2593); El Oued (ZFMK 17984-985); Ghardaia (ZFMK 19415); Ouargla (ZFMK 2597-2598); Touggourt (ZFMK 2595-2596). TUNISIA: Hazoua (ZFMK 49571); Oasis Nefta (ZFMK 17986); Tunisian Sahara (ZFMK 2601-2604).